

## Chapter Seven Study Guide Answers

### Outline

#### I. Periodic Table Trends

A. Atomic Radii

B. Ionic Radii

C. Ionization Energy

D. Electron Affinity

E. Electronegativity

F. Metal Character

#### II. Periodic Table Family Properties

A. Alkali Metal Family (Group IA)

B. Alkaline Earth Metal Family (Group IIA)

C. Boron Family (Group IIIA)

D. Carbon Family (Group IVA)

E. Nitrogen Family (Group VA)

F. Oxygen Family (Group VIA)

G. Halogen Family (Group VIIA)

H. Noble Gas Family (Group VIIIA)

### Practice Problems

1. Which of the following elements is the most reactive?

- a. P            b. O            **c. F**            d. He

2. Which element has the smallest second ionization energy?

- a. K            **b. Mg**            c. Li            d. Be

3. Which of the following elements has the smallest atomic radii?

- a. P            b. O            **c. F**            d. N

4. Which of the following elements has the most negative electron affinity?

- a. P            b. O            **c. F**            d. N

5. What is the general formula for the oxides formed by alkaline earth metals. **RO**

6. The cation has a radius that is **smaller** or larger than the atom that it is formed from.  
(Circle One)

7. Put the following elements in order of increasing radius.

- a. Na, K, Rb            **Na < K < Rb**
- b. As, Se, Br           **Br < Se < As**
- c. Rb, Rh, I            **I < Rh < Rb**

8. Put the following elements in order of increasing ionization energy.

- a. Na, K, Rb
- b. As, Se, Br
- c. Rb, Rh, I

9. Which of the following oxides are ionic? Which are molecular?

- a. SO<sub>2</sub> **Molecular**
- b. MgO **Ionic**
- c. Li<sub>2</sub>O **Ionic**
- d. P<sub>2</sub>O<sub>5</sub> **Molecular**
- e. Y<sub>2</sub>O<sub>3</sub> **Ionic**
- f. N<sub>2</sub>O **Molecular**
- g. XeO<sub>3</sub> **Molecular**

10. Which of the following has the smallest atomic radius?

- a. Ba
- b. Cl
- c. **Ne**
- d. S
- e. Sn

11. Which lists the following in order of more negative electron affinity: F, Br, Sb, Rb, Se

- a. Br < Se < Sb < Rb < F
- b. Se < Rb < Sb < Br < F
- c. Sb < Br < Rb < Se < F
- d. Br < F < Rb < Sb < Se
- e. **Rb < Sb < Se < Br < F**

12. Select the atom from the following with the smallest second ionization energy.

- a. Al
- b. Be
- c. Li
- d. **Mg**
- e. Na

13. Select the atom from the following with the largest radius

- a. **Cs**
- b. K
- c. Li
- d. Na
- e. Rb

14. Select the ion from the following with the largest radius.
- $F^-$
  - $Cl^-$
  - $Br^-$
  - $I^-$**
15. Select the arrangement that shows atoms in order of decreasing electron affinity.
- $K > Na > Li > H$
  - $H > Li > Na > K$**
  - $H > K > Li > Na$
  - $Na > Li > K > H$
  - $Li > Na > K > H$
16. Select the arrangement that shows atoms in order of decreasing first ionization energy.
- $Li > Na > K > Rb$**
  - $Rb > K > Na > Li$
  - $K > Li > Na > Rb$
  - $Rb > Na > Li > K$
  - $Na > Li > K > Rb$
17. Select the arrangement that shows atoms in order of increasing electronegativity.
- $Br < Se < Sr < In < Fr$
  - $Fr < Sr < Se < Br < In$
  - $In < Fr < Sr < Se < Br$
  - $Fr < Sr < In < Se < Br$**
  - $Se < Br < Se < In < Sr$
18. To what family, period, or region of the periodic table does the element Ar belong?
- Noble gases**
  - Transition metals
  - Lanthanide series
  - Actinide series
  - Alkali metals
19. List in order of increasing size:  $K^+$ ,  $Se^{2-}$ ,  $Cl^-$ ,  $Na^+$ ,  $S^{2-}$
- $Cl^- < S^{2-} < K^+ < Na^+ < Se^{2-}$
  - $Na^+ < K^+ < Cl^- < S^{2-} < Se^{2-}$**
  - $S^{2-} < Na^+ < Cl^- < Se^{2-} < K^+$
  - $Cl^- < Se^{2-} < K^+ < Na^+ < S^{2-}$
  - $K^+ < Na^+ < Cl^- < Se^{2-} < S^{2-}$
20. Select the arrangement that shows atoms in order of increasing electron affinity.
- $Cl < O < C < Li$
  - $Li < C < O < Cl$**
  - $C < Cl < Li < O$
  - $O < Li < Cl < C$

21. List at least three elements that belong to each of the following periods, groups, or families.
- Noble gases- **Ne, Ar, Kr, Xe, Rn**
  - Transition metals- **Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Ga, Al, Y, Zr, Nb, Mo, etc.**
  - Lanthanide series- **La, Ce, Pr, Nd, Pm, etc.**
  - Actinide series- **Ac, Th, Pa U, Np, etc.**
  - Representative elements- **B, Si, Ge, As, Sb, Te, At**
22. When an atom forms an anion, the radius is \_\_\_\_\_ than the atom.
- Larger**
  - Smaller
  - Same size
23. Which of the listed elements is the poorest conductor of both heat and electricity?
- Al
  - Bi
  - Co
  - Mg
  - P**